

WHAT WE CLAIM IS:

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X. A fire-retardant resin composition, which comprises:

- 5 a thermoplastic resin component (A) comprising (a) 100 parts by weight of a block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound
10 as its constitutional component, and/or a hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) 10 to 100 parts by weight of a nonaromatic-series softening agent for rubber, (c) 30 to 400 parts by weight of an ethylene/ α -olefin copolymer, and (d) 0 to 200
15 parts by weight of a polypropylene-resin; and
(e) 0.01 to 0.6 parts by weight of an organic peroxide, (f) 0.03 to 1.8 parts by weight of a (meth)acrylate-series and/or allyl-series crosslinking aid,
and 50 to 300 parts by weight of a metal hydrate (B),
20 respectively to 100 parts by weight of the thermoplastic resin component (A),

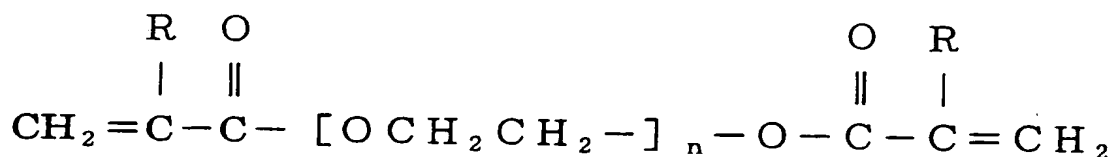
wherein the metal hydrate (B) is such that (i) when the metal hydrate (B) is in an amount of 50 parts by weight or more but less than 100 parts by weight, 50 parts
25 by weight or more of the metal hydrate (B) to 100 parts by

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weight of the thermoplastic resin component (A) is made up
of a metal hydrate that is being pretreated with a silane
coupling agent; or (ii) when the metal hydrate (B) is in
an amount of 100 parts by weight or more but 300 parts by
5 weight or less, at least half of the amount of the metal
hydrate (B) is made up of a metal hydrate that is being
pretreated with a silane coupling agent; and
the fire-retardant resin composition is a mixture of the
above formulation that is heated and kneaded at a
10 temperature equal to or higher than the melting
temperature of the thermoplastic resin component (A).

2. The fire-retardant resin composition as claimed
in claim 1, wherein the crosslinking aid (f) is a
15 (meth)acrylate-series crosslinking aid represented by the
formula:



wherein R represents H or CH₃, and n is an integer
25 of 1 to 9.

3. The fire-retardant resin composition as claimed in claim 1, wherein the metal hydrate (B) is magnesium hydroxide.

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4. The fire-retardant resin composition as claimed in claim 1, wherein the ~~silane~~ coupling agent is a silane compound having a vinyl group and/or an epoxy group at its terminal.

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Sub A2 5. A fire-retardant resin composition, which comprises:

a thermoplastic resin component (A) comprising (a) 100 parts by weight of a block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or a hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) 10 to 100 parts by weight of a nonaromatic-series softening agent for rubber, (c) 50 to 250 parts by weight of an ethylene/ α -olefin copolymer, and (d) 0 to 100 parts by weight of a polypropylene resin; and

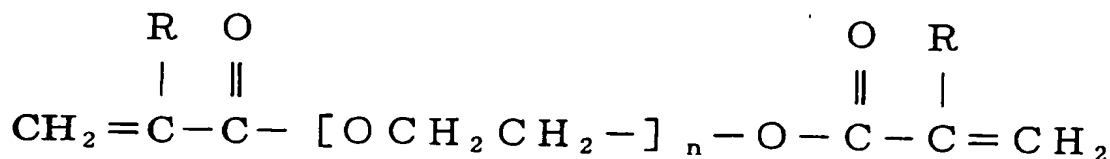
(e) 0.01 to 0.6 parts by weight of an organic peroxide, (f) 0.03 to 1.8 parts by weight of a

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(meth)acrylate-series and/or allyl-series crosslinking aid,
and 50 to 300 parts by weight of a metal hydrate (B),
respectively to 100 parts by weight of the thermoplastic
resin component (A),

5 wherein the metal hydrate (B) is such that (i) when
the metal hydrate (B) is in an amount of 50 parts by
weight or more but less than 100 parts by weight, 50 parts
by weight or more of the metal hydrate (B) to 100 parts by
weight of the thermoplastic resin component (A) is made up
10 of a metal hydrate that is being pretreated with a silane
coupling agent; or (ii) when the metal hydrate (B) is in
an amount of 100 parts by weight or more but 300 parts by
weight or less, at least half of the amount of the metal
hydrate (B) is made up of a metal hydrate that is being
15 pretreated with a silane coupling agent; and
the fire-retardant resin composition is a mixture of the
above formulation that is heated and kneaded at a
temperature equal to or higher than the melting
temperature of the thermoplastic resin component (A).

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6. The fire-retardant resin composition as claimed
in claim 5, wherein the crosslinking aid (f) is a
(meth)acrylate-series crosslinking aid represented by the
formula:



wherein R represents H or CH₃, and n is an integer of 1 to 9.

10 7. The fire-retardant resin composition as claimed in claim 5, wherein the metal hydrate (B) is magnesium hydroxide.

15 8. The fire-retardant resin composition as claimed in claim 5, wherein the silane coupling agent is a silane compound having a vinyl group and/or an epoxy group at its terminal.

20 9. A molded article, which has a covering layer of a fire-retardant resin composition, on the outside of a conductor, or an optical fiber element wire or/and an optical fiber core wire,

wherein the fire-retardant resin composition comprises:

25 a thermoplastic resin component (A) comprising (a)

100 parts by weight of a block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or a hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) 10 to 100 parts by weight of a nonaromatic-series softening agent for rubber, (c) 30 to 400 parts by weight of an ethylene/ α -olefin copolymer, and (d) 0 to 200 parts by weight of a polypropylene resin; and

(e) 0.01 to 0.6 parts by weight of an organic peroxide, (f) 0.03 to 1.8 parts by weight of a (meth)acrylate-series and/or allyl-series crosslinking aid, and 50 to 300 parts by weight of a metal hydrate (B), respectively to 100 parts by weight of the thermoplastic resin component (A),

wherein the metal hydrate (B) is such that (i) when the metal hydrate (B) is in an amount of 50 parts by weight or more but less than 100 parts by weight, 50 parts by weight or more of the metal hydrate (B) to 100 parts by weight of the thermoplastic resin component (A) is made up of a metal hydrate that is being pretreated with a silane coupling agent; or (ii) when the metal hydrate (B) is in an amount of 100 parts by weight or more but 300 parts by weight or less, at least half of the amount of the metal

hydrate (B) is made up of a metal hydrate that is being pretreated with a silane coupling agent; and the fire-retardant resin composition is a mixture of the above formulation that is heated and kneaded at a temperature equal to or higher than the melting temperature of the thermoplastic resin component (A).

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10. A molded part, which is obtained by molding a fire-retardant resin composition,

10 wherein the fire-retardant resin composition comprises:

a thermoplastic resin component (A) comprising (a) 100 parts by weight of a block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or a hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) 10 to 100 parts by weight of a nonaromatic-series softening agent for rubber, (c) 50 to 250 parts by weight of an ethylene/ α -olefin copolymer, and (d) 0 to 100 parts by weight of a polypropylene resin; and

(e) 0.01 to 0.6 parts by weight of an organic peroxide, (f) 0.03 to 1.8 parts by weight of a (meth)acrylate-series and/or allyl-series crosslinking aid,

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and 50 to 300 parts by weight of a metal hydrate (B),
respectively to 100 parts by weight of the thermoplastic
resin component (A),

wherein the metal hydrate (B) is such that (i) when
5 the metal hydrate (B) is in an amount of 50 parts by
weight or more but less than 100 parts by weight, 50 parts
by weight or more of the metal hydrate (B) to 100 parts by
weight of the thermoplastic resin component (A) is made up
of a metal hydrate that is being pretreated with a silane
10 coupling agent; or (ii) when the metal hydrate (B) is in
an amount of 100 parts by weight or more but 300 parts by
weight or less, at least half of the amount of the metal
hydrate (B) is made up of a metal hydrate that is being
pretreated with a silane coupling agent; and
15 the fire-retardant resin composition is a mixture of the
above formulation that is heated and kneaded at a
temperature equal to or higher than the melting
temperature of the thermoplastic resin component (A).

20 11. A method for preparing a fire-retardant resin
composition, which comprises heating and kneading,
simultaneously, at the temperature equal to or higher than
the melting temperature of the following thermoplastic
resin component (A), (a) a block copolymer made up of at
25 least two polymer blocks A mainly made of a vinyl aromatic

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compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or a hydrogenated block copolymer obtained by hydrogenating the block

5 copolymer, (b) a nonaromatic-series softening agent for rubber, (c) an ethylene/ α -olefin copolymer, (d) a polypropylene resin, (e) an organic peroxide, (f) a (meth)acrylate-series and/or allyl-series crosslinking aid, and a metal hydrate (B), to carry out crosslinking,

10 wherein the fire-retardant resin composition comprises:

the thermoplastic resin component (A) comprising (a) 100 parts by weight of the block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic
15 compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or the hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) 10 to 100 parts by weight of the
20 nonaromatic-series softening agent for rubber, (c) 30 to 400 parts by weight of the ethylene/ α -olefin copolymer, and (d) 0 to 200 parts by weight of the polypropylene resin; and

(e) 0.01 to 0.6 parts by weight of the organic
25 peroxide, (f) 0.03 to 1.8 parts by weight of the

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(meth)acrylate-series and/or allyl-series crosslinking aid,
and 50 to 300 parts by weight of the metal hydrate (B),
respectively to 100 parts by weight of the thermoplastic
resin component (A);

5 wherein the metal hydrate (B) is such that (i) when
the metal hydrate (B) is in an amount of 50 parts by
weight or more but less than 100 parts by weight, 50 parts
by weight or more of the metal hydrate (B) to 100 parts by
weight of the thermoplastic resin component (A) is made up
10 of a metal hydrate that is being pretreated with a silane
coupling agent; or (ii) when the metal hydrate (B) is in
an amount of 100 parts by weight or more but 300 parts by
weight or less, at least half of the amount of the metal
hydrate (B) is made up of a metal hydrate that is being
15 pretreated with a silane coupling agent.

12. A method for preparing a fire-retardant resin
composition, which comprises heating and kneading,
simultaneously, at the temperature equal to or higher than
20 the melting temperature of the following thermoplastic
resin component (A), (a) a block copolymer made up of at
least two polymer blocks A mainly made of a vinyl aromatic
compound as its constitutional component and at least one
polymer block B mainly made of a conjugated diene compound
25 as its constitutional component, and/or a hydrogenated

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block copolymer obtained by hydrogenating the block
copolymer, (b) a nonaromatic-series softening agent for
rubber, (c) an ethylene/ α -olefin copolymer, (d) a
polypropylene resin, (e) an organic peroxide, (f) a
5 (meth)acrylate-series and/or allyl-series crosslinking aid,
and a metal hydrate (B), to carry out crosslinking,
wherein the fire-retardant resin composition
comprises:

the thermoplastic resin component (A) comprising (a)
10 100 parts by weight of the block copolymer made up of at
least two polymer blocks A mainly made of a vinyl aromatic
compound as its constitutional component and at least one
polymer block B mainly made of a conjugated diene compound
as its constitutional component, and/or the hydrogenated
15 block copolymer obtained by hydrogenating the block
copolymer, (b) 10 to 100 parts by weight of the
nonaromatic-series softening agent for rubber, (c) 50 to
250 parts by weight of the ethylene/ α -olefin copolymer,
and (d) 0 to 100 parts by weight of the polypropylene
20 resin; and

(e) 0.01 to 0.6 parts by weight of the organic
peroxide, (f) 0.03 to 1.8 parts by weight of the
(meth)acrylate-series and/or allyl-series crosslinking aid,
and 50 to 300 parts by weight of the metal hydrate (B),
25 respectively to 100 parts by weight of the thermoplastic

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resin component (A),

wherein the metal hydrate (B) is such that (i) when the metal hydrate (B) is in an amount of 50 parts by weight or more but less than 100 parts by weight, 50 parts by weight or more of the metal hydrate (B) to 100 parts by weight of the thermoplastic resin component (A) is made up of a metal hydrate that is being pretreated with a silane coupling agent; or (ii) when the metal hydrate (B) is in an amount of 100 parts by weight or more but 300 parts by weight or less, at least half of the amount of the metal hydrate (B) is made up of a metal hydrate that is being pretreated with a silane coupling agent.

13. A method for preparing a fire-retardant resin composition, which comprises:

a first step of heating and kneading (a) a block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or a hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) a nonaromatic-series softening agent for rubber, (c) an ethylene/ α -olefin copolymer, and (d) a polypropylene resin, to obtain a thermoplastic resin component (A), and

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a second step of heating and kneading, at the temperature equal to or higher than the melting temperature of the thermoplastic resin component (A), the resultant resin component (A), (e) an organic peroxide, (f) a (meth)acrylate-series and/or allyl-series crosslinking aid, and a metal hydrate (B), to carry out crosslinking,

wherein the fire-retardant resin composition comprises:

the thermoplastic resin component (A) comprising (a) 100 parts by weight of the block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or the hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) 10 to 100 parts by weight of the nonaromatic-series softening agent for rubber, (c) 30 to 400 parts by weight of the ethylene/ α -olefin copolymer, and (d) 0 to 200 parts by weight of the polypropylene resin; and

(e) 0.01 to 0.6 parts by weight of the organic peroxide, (f) 0.03 to 1.8 parts by weight of the (meth)acrylate-series and/or allyl-series crosslinking aid, and 50 to 300 parts by weight of the metal hydrate (B),

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respectively to 100 parts by weight of the thermoplastic resin component (A),

wherein the metal hydrate (B) is such that (i) when the metal hydrate (B) is in an amount of 50 parts by

5 weight or more but less than 100 parts by weight, 50 parts by weight or more of the metal hydrate (B) to 100 parts by weight of the thermoplastic resin component (A) is made up of a metal hydrate that is being pretreated with a silane coupling agent; or (ii) when the metal hydrate (B) is in
10 an amount of 100 parts by weight or more but 300 parts by weight or less, at least half of the amount of the metal hydrate (B) is made up of a metal hydrate that is being pretreated with a silane coupling agent.

15 14. A method for preparing a fire-retardant resin composition, which comprises:

a first step of heating and kneading (a) a block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional
20 component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or a hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) a nonaromatic-series softening agent for rubber, (c) an ethylene/ α -
25 olefin copolymer, and (d) a polypropylene resin, to obtain

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a thermoplastic resin component (A), and

a second step of heating and kneading, at the temperature equal to or higher than the melting temperature of the thermoplastic resin component (A), the resultant resin component (A), (e) an organic peroxide, (f) a (meth)acrylate-series and/or allyl-series crosslinking aid, and a metal hydrate (B), to carry out crosslinking,

wherein the fire-retardant resin composition comprises:

the thermoplastic resin component (A) comprising (a) 100 parts by weight of the block copolymer made up of at least two polymer blocks A mainly made of a vinyl aromatic compound as its constitutional component and at least one polymer block B mainly made of a conjugated diene compound as its constitutional component, and/or the hydrogenated block copolymer obtained by hydrogenating the block copolymer, (b) 10 to 100 parts by weight of the nonaromatic-series softening agent for rubber, (c) 50 to 250 parts by weight of the ethylene/ α -olefin copolymer, and (d) 0 to 100 parts by weight of the polypropylene resin; and

(e) 0.01 to 0.6 parts by weight of the organic peroxide, (f) 0.03 to 1.8 parts by weight of the (meth)acrylate-series and/or allyl-series crosslinking aid,

Sub AB and 50 to 300 parts by weight of the metal hydrate (B),
respectively to 100 parts by weight of the thermoplastic
resin component (A),

wherein the metal hydrate (B) is such that (i) when
5 the metal hydrate (B) is in an amount of 50 parts by
weight or more but less than 100 parts by weight, 50 parts
by weight or more of the metal hydrate (B) to 100 parts by
weight of the thermoplastic resin component (A) is made up
of a metal hydrate that is being pretreated with a silane
10 coupling agent; or (ii) when the metal hydrate (B) is in
an amount of 100 parts by weight or more but 300 parts by
weight or less, at least half of the amount of the metal
hydrate (B) is made up of a metal hydrate that is being
pretreated with a silane coupling agent.

15 15. A fire-retardant resin composition, which
comprises:

a thermoplastic resin composition (A) comprising (a)
100 parts by weight of a block copolymer made up of at
20 least two polymer blocks A mainly made of a vinyl aromatic
compound as its constitutional component and at least one
polymer block B mainly made of a conjugated diene compound
as its constitutional component, and/or a hydrogenated
block copolymer obtained by hydrogenating the block
25 copolymer, (b) 30 to 70 parts by weight of a nonaromatic-

series softening agent for rubber, (c) 10 to 60 parts by
weight of a polypropylene-series resin, (d) 50 to 200
parts by weight of an ethylene/ α -olefin copolymer having a
density of 0.91 g/cm³ or less that is synthesized in the
5 presence of a single site catalyst, and (e) 0.1 to 1.5
parts by weight of an organic peroxide; and
100 to 250 parts by weight of a metal hydrate (B),
to 100 parts by weight of the thermoplastic resin
composition (A).